



March 2, 2006

Dear Tour Attendees:

We would like to take this opportunity to thank you for joining us today for this exciting event. Jordan Valley Water Conservancy District, Kennecott Utah Copper Corporation, and the Utah Department of Environmental Quality have been working cooperatively for several years to develop and define the Southwest Jordan Valley Groundwater Project, making a new, high quality water resource available to some of the fastest growing cities in the State of Utah.

Today you will be viewing the first phase of the Groundwater Project at the Bingham Canyon Water Treatment Plant. This first phase extracts precious groundwater from deep aquifers in the southwestern Salt Lake Valley and treats it through a reverse osmosis process to provide the public with safe, high quality drinking water that meets all federal and state regulations.

This project is truly a breakthrough in the water purification process and is defined by the unique relationship between Jordan Valley, Kennecott, and the Utah Department of Environmental Quality. With the implementation of this treatment process, the State of Utah will be one step closer to meeting the increasing needs for high quality water caused by the state's rapidly growing population. The Bingham Canyon Water Treatment Plant will produce 3,500 acre-feet of water annually, providing for approximately 4,300 homes. Eventually, additional treatment facilities will be constructed by the Jordan Valley Water Conservancy District that will enable the District to deliver at least 8,235 acre-feet of water per year through the Southwest Jordan Valley Groundwater Project.

Again, we would like to thank you for joining us today. We hope that you will find this tour to be both informative and beneficial. Please let us know if you have any questions or would like further information on the efforts behind this project.

Sincerely,

A handwritten signature in blue ink, reading "David G. Ovard".

David G. Ovard  
CEO, General Manager  
Jordan Valley Water  
Conservancy District

A handwritten signature in blue ink, reading "Bill Champion".

Bill Champion  
CEO/President  
Kennecott Utah  
Copper Corporation

A handwritten signature in blue ink, reading "Dianne R. Nielson".

Dianne R. Nielson, Ph.D.  
Executive Director  
Utah Department of  
Environmental Quality



## **Bingham Canyon Water Treatment Plant Tour Agenda**

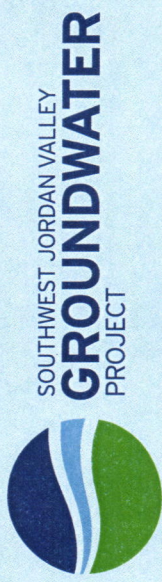
*Bus hosts: Mark Atencio and Paula Doughty @ DEQ; Richard Bay and Kelly Payne @ JVVCD.*

- 8:00 am** Buses will arrive at the Department of Environment Quality and Jordan Valley Water.  
*Orange juice and a doughnut will be provided each participant.*
- 8:15 am** DEQ bus leaves for KUCC Lark Gate; JVVCD bus leaves Jordan Valley Water.
- 9:00 am** Buses arrive at the Lark Gate - participants are provided with Certificates of Hazard Training to complete before departing.
- 9:10 am** Buses leave for pit lookout upon completing Certificates of Hazard.
- 9:20 am** Arrive at pit lookout - both buses meet at this location.
- 9:40 am** Depart pit lookout for drive through Southwest Reclamation Area.
- 10:00 am** Arrive reverse Bingham Canyon Water Treatment Plant – hard hats and protective eye gear will be distributed to participants prior to departing bus for reverse osmosis tour.
- 10:05 am** Welcoming remarks
- 10:15 am** Begin tour of the reverse osmosis plant
- 11:00 am** Tours completed and buses and media vans leave RO plant site.
- Noon:** All buses return participants to initial embarkation point.

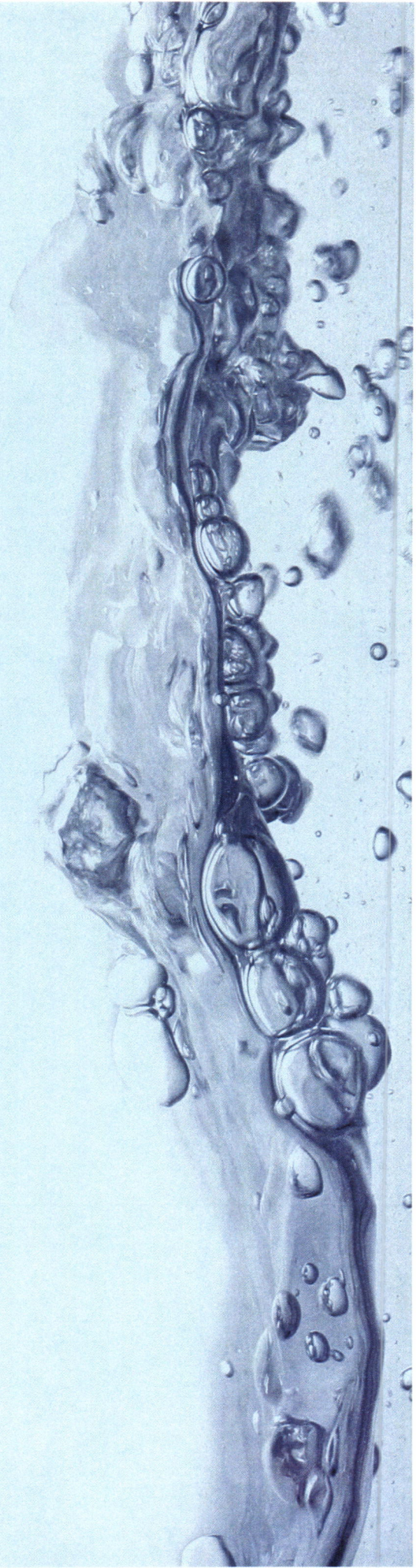
*\*\*Please note\*\**

*Restrooms are available on the buses and additional but limited restroom facilities are available at the KUCC pit overlook and at the Bingham Canyon Water Treatment Plant.*





# Information Packet





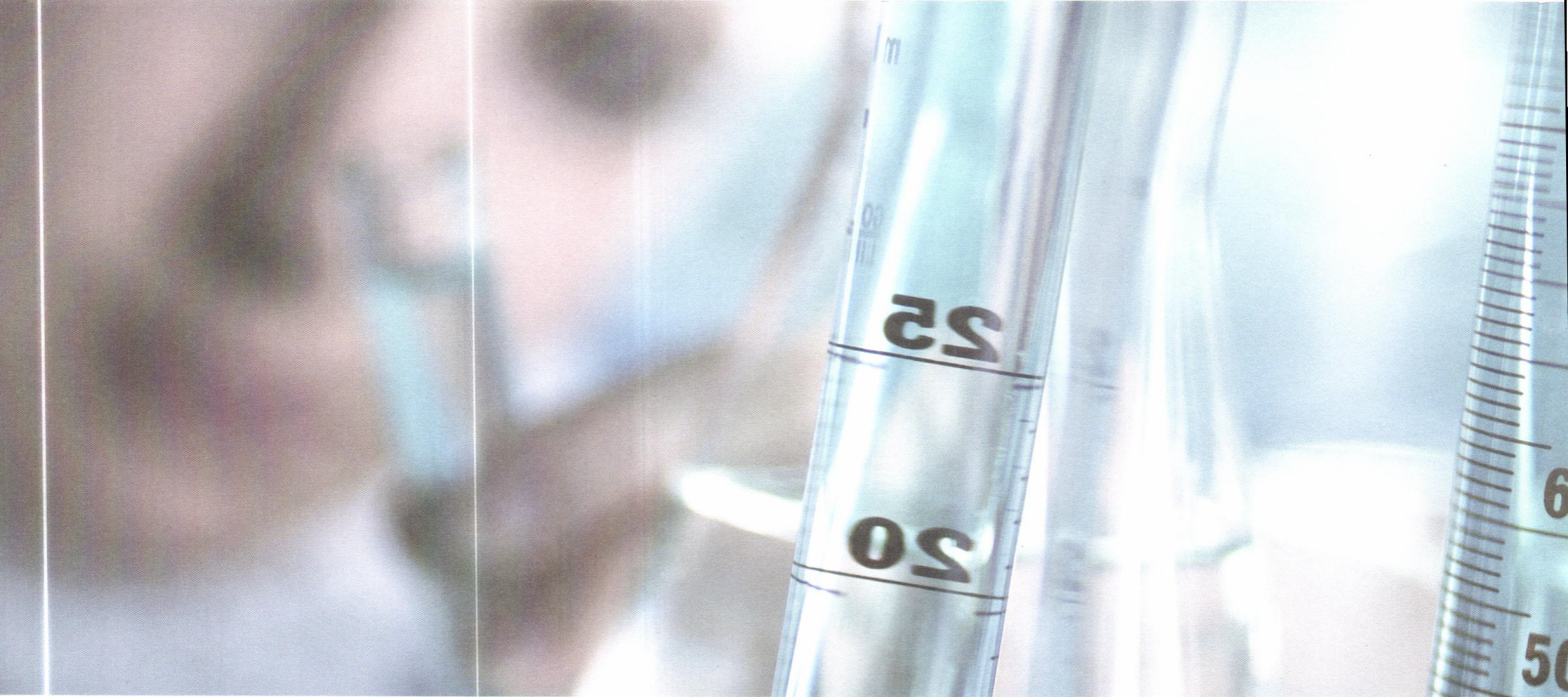


# A New Water Source

Reliable, quality water for our communities







Jordan Valley Water Conservancy District is pleased to announce that after years of effort a new source of high quality water will be delivered to the communities we serve.

For years, Jordan Valley has been working with other entities to develop a system for extracting precious groundwater from deep aquifers in the southwestern Salt Lake Valley and treating it through reverse osmosis to provide the public with safe, high quality drinking water. Beginning in April 2006, the cities of West Jordan, South Jordan, Riverton and Herriman will start receiving some of this water from a new reverse osmosis treatment plant named Bingham Canyon Water Treatment Plant.

This will be the first phase of Jordan Valley being able to deliver more than 8,000 acre-feet of water per year through our Southwest Jordan Valley Groundwater Project.



## WORKING FOR WATER

For a state that only receives, on average, 13 inches of precipitation each year and is one of the nation's fastest growing areas, managing and developing water resources is a challenge. And in the rapidly growing southwestern Salt Lake Valley, which is expected to grow 85 percent over the next 30 years, this task becomes even more difficult.

That is why Jordan Valley has been cooperatively working for years with Kennecott Utah Copper Corporation, Utah Department of Environmental Quality and the Environmental Protection Agency to develop and define a project which will capture deep underground waters impacted by mining and other activities, purify the water and deliver it to communities in the

southwestern Salt Lake Valley.

Kennecott has paid for the cost of developing and treating this underground water by funding a trust fund, which is managed by the executive director of the Department of Environmental Quality, acting as the Trustee for natural resources. Jordan Valley and Kennecott have developed the Project now known as the Southwest Jordan Valley Groundwater Project, which is overseen by the Trustee and various other regulatory agencies.

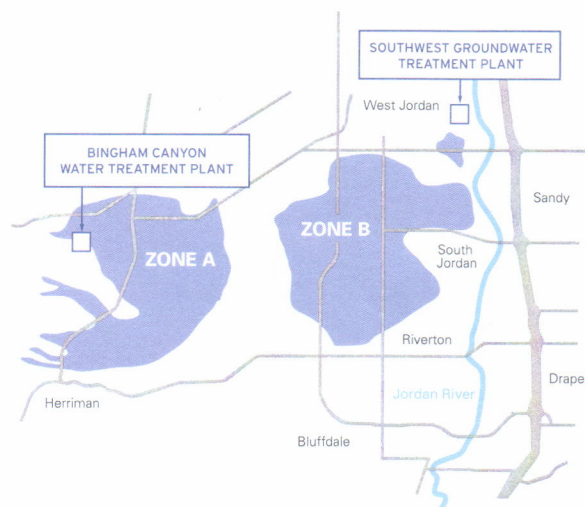
Many have hailed this Project as the most significant groundwater project in America because of the high level of cooperation between the entities involved.





## ABOUT THE PROJECT

The Southwest Jordan Valley Groundwater Project is divided into two parts, corresponding to the two areas of groundwater that needed to be cleaned up, called Zone A and Zone B. The Project includes deep wells, pipelines and two reverse osmosis treatment plants. The treatment of Zone A water will occur at Kennecott's new Bingham Canyon Water Treatment Plant. Jordan Valley will then build, with funding from Kennecott, all facilities for the treatment of water in Zone B. Jordan Valley will deliver all treated water resulting from the project to the communities it serves.



*"The cooperative efforts of Jordan Valley Water Conservancy District and Kennecott Utah Copper Corporation will not only bring an excellent quality water supply from a high-tech treatment process to the public in the southwestern Salt Lake Valley, but will also benefit the public throughout the Valley through the groundwater production and protection aspects of this project."*

—Dr. Dianne R. Nielson, Utah Department of Environmental Quality Executive Director and Utah Trustee for Natural Resources



## KENNECOTT'S WATER TREATMENT PLANT

To treat the water extracted from the deep underground aquifers, Kennecott has constructed a water treatment plant near Bingham Canyon. This Bingham Canyon Water Treatment Plant uses a well-known, dependable, high-tech process known as reverse osmosis. The Plant will produce 3,500 acre-feet per year of high quality water, beginning in April 2006. An acre-foot is equal to the volume of water that would cover one acre with 12 inches of water. An average household uses .8 to 1 acre-foot of water per year.

The treated water will then be delivered to Jordan Valley, which will pump, convey, store and deliver the water to communities in the southwestern Salt Lake Valley.







## WATER QUALITY ASSURANCE

At Jordan Valley Water Conservancy District we work very hard to deliver safe, high quality water to the communities we serve and our customers. We do this through analysis, monitoring, process control, providing ongoing training and education for our employees, looking for ways to operate our system more efficiently and upgrading equipment used for water distribution.

The water obtained through the Southwest Jordan Valley Groundwater Project will be rigorously tested by Kennecott before it leaves the Bingham Canyon Water Treatment Plant to ensure it meets all federal and state regulations.

Once the water is delivered to Jordan Valley, the District will again conduct a series of tests to verify water quality and aesthetics. The test results will be reported to the Department of Environmental Quality, and the water will then be blended with our other water sources.



## PUBLIC OUTREACH

Jordan Valley will be actively communicating information about the Southwest Jordan Valley Groundwater Project to residents in the community over the next few months. Jordan Valley will be meeting with local decision makers, hosting public open houses, distributing informational materials, working with the media and coordinating public displays in high traffic public areas.



# Reverse Osmosis

Reverse osmosis is a process where pressure is used to push water through a membrane, leaving salts behind. It is a proven treatment technology that meets the requirements of all federal and state drinking water standards.

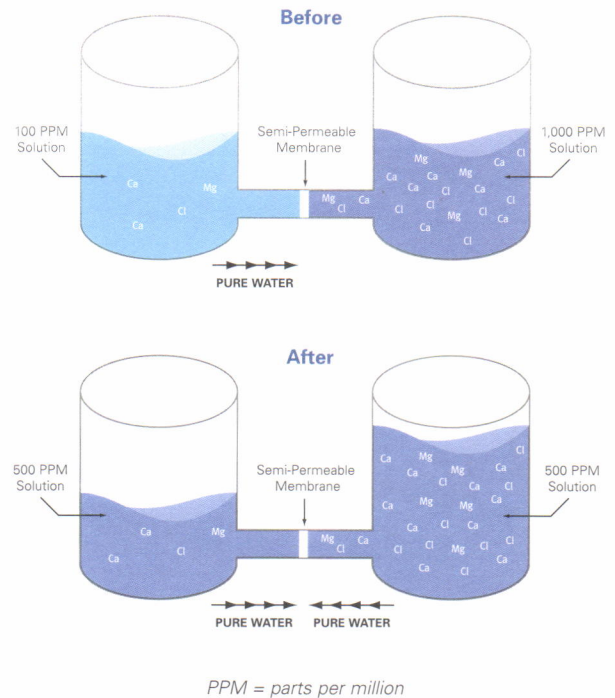
## How Osmosis Works:

Osmosis can be explained by separating two containers of water with a semi-permeable membrane. One container has a high concentration of dissolved salts, and the other container has a lower concentration. The membrane between the two containers allows water to flow in either direction, but the salts must remain in their original containers. Natural osmosis causes water to flow from the less concentrated solution through the semi-permeable membrane until the concentrations on both side are equal.

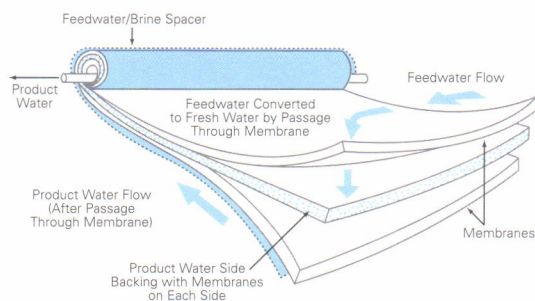
## How Reverse Osmosis Works:

Reverse osmosis is the reversal of the direction of the normal flow of water during osmosis by applying pressure. When the pressure is applied to the solution on one side of the membrane the water starts to flow through the semi-permeable membrane. Due to the characteristics of the membrane, the dissolved salts cannot pass through the membrane. By pumping water through a semi-permeable membrane the salts are left behind and high quality water can be produced.

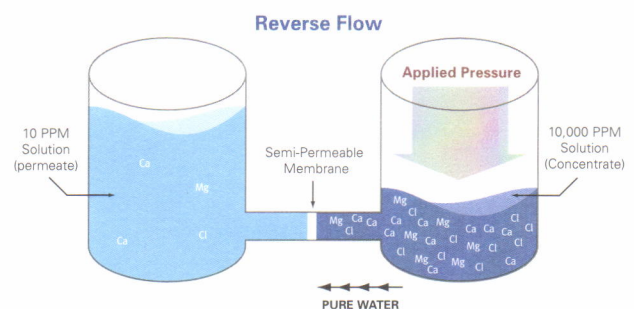
## Osmosis



## Reverse Osmosis



*This diagram shows how semi-permeable membranes are constructed and how they are placed into municipal spiral wound cartridges.*



Bingham Canyon Water Treatment Plant's reverse osmosis facility is the first municipal plant of its kind in the state of Utah. However, nationwide there are more than 300 reverse osmosis treatment plants that produce more than 1 billion gallons of water per day for drinking water use. The majority of these facilities are located in Florida, California and Texas.



#### Jordan Valley's Board of Trustees

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David G. Ovard, CEO, General Manager  
Richard P. Bay, Assistant General Manager, Chief Engineer  
Barton A. Forsyth, Assistant General Manager, Water Supply/Water Quality  
Linda Townes, Communications Editor

*"We are extremely excited with the prospect of delivering this high quality water supply to the fast growing communities of West Jordan, South Jordan, Riverton and Herriman."*

—Dave Ovard, General Manager, Jordan Valley Water Conservancy District

For more information about the Southwest Jordan Valley Groundwater Project, or about the District in general, call Jordan Valley Water Conservancy District at 565-4300 or visit [www.jvwcd.org](http://www.jvwcd.org).



## **BACKGROUNDER**

Date: March 2, 2006

Media Contact: Cindy Gubler (801) 531-0244



## **About The Southwest Jordan Valley Groundwater Project**

### **Project Overview**

The Southwest Jordan Valley Groundwater Project is one of the nation's largest and most unique groundwater cleanup projects. The Project, which includes the remediation of contaminated plumes that encompass 50 square miles, is a joint effort between Jordan Valley Water Conservancy District (JVWCD), the Department of Environmental Quality (DEQ) and Kennecott Utah Copper Corporation (KUCC) that blends the cleaning up of groundwater with a public water supply project.

The purpose of the project is to contain contaminated groundwater plumes, located in the southwestern Salt Lake Valley, from further expanding, to remediate the aquifer and remove the contamination in the long term, and to produce municipal quality water for the public in the affected areas.

The project includes extracting water from the contaminated plumes and treating it through a reverse osmosis process to produce high-quality drinking water for the impacted cities of West Jordan, South Jordan, Riverton and Herriman.

The proposed cleanup plan divides the project into two parts, corresponding to the two contaminated plumes, called Zone A and Zone B. The project includes two sets of deep extraction wells, two reverse osmosis water treatment plants with collection and treated water pipelines, and a set of shallow extraction wells that will collect and treat water from near the Jordan River.

KUCC has built and will operate one of the reverse osmosis treatment plants in the Zone A portion of the project, the Bingham Canyon Water Treatment Plant. The remainder of the project will be built and operated by JVWCD, including the Southwest Groundwater Treatment Plant, which will be located in West Jordan and is projected to start up by Spring of 2009.

Over the next 40 years, the contaminated groundwater will be withdrawn from the aquifer and treated to provide municipal-quality water to the public in the affected areas.

### **How Did The Groundwater Become Contaminated?**

The contamination plumes identified by the project, were caused by 100 years of mining and other activities. These activities included land use practices, open pit mining, creation of tailings and crushed rock waste rock dumps, leaching waste rock for capture of dissolved metals, and collection of subsurface flow through mining and leaching areas.

—more—



The result has been the creation of a much greater surface area of mineral rich rock and ore exposed to water. As precipitation water and leach water passed across this greatly increased rock surface area, concentrations of sulfate ions and trace metals increased. In addition, acidic water conditions were created.

The groundwater with elevated sulfate concentrations has continued to flow northeastward. Diffusion and dispersion mechanisms have caused the contaminated water zones to spread out laterally and downward vertically. These mechanisms have created shapes of contaminated water that appear to be plumes. Some containment of the western zone A plume has been accomplished by Kennecott through pumping of water.

If left unchecked the plumes would migrate north through the center of the Salt Lake Valley impacting other groundwater areas.

### **What Is The Contaminant?**

The contaminant that was introduced to the aquifer by mining activities is sulfate. Sulfate can cause a laxative effect on humans. Infants and travelers not accustomed to the water are especially susceptible.

The drinking water sulfate concentration standard to protect human health is 500 milligrams per liter. The EPA drinking water sulfate concentration standard for taste is 250 milligrams per liter. The two plumes of contamination in this project have sulfate concentrations that range from 500 to more than 20,000 milligrams per liter.

### **How The Unique Partnership Was Formed**

During the mid 1980s, the nature and the extent of the groundwater contamination began to be better documented and understood, and in 1995 a Consent Decree was finalized that required KUCC to complete all source control efforts it had already been pursuing since 1990. It also required Kennecott to pay a cash settlement and to provide a letter of credit, with a combined value of \$37 million to be put in a trust fund to remediate the contaminated groundwater.

The Consent Decree allowed KUCC to provide municipal-quality drinking water to a purveyor of municipal and industrial water and gain a reduction in its letter of credit. JWWCD agreed to work with KUCC to distribute the water to the public in accordance with the Consent Decree. KUCC and JWWCD commissioned a joint study to determine the best project to accomplish the Consent Decree. KUCC and JWWCD then formulated a Project Proposal that was accepted by DEQ and is currently being carried out.

### **What Is The Project's Cost?**

The \$100 million project includes hard cash dollars and in-kind assets to clean up the contaminated groundwater. KUCC is responsible to pay for the damage caused by mining contamination of sulfate in the groundwater. KUCC paid \$37 million to a natural resources trust fund in 1995. Since that time the trust fund has grown to more than \$62 million. JWWCD is assuming only those costs related to normal water development and treatment, which are projected to be \$5 to \$10 million in capital costs.

###

**FACT SHEET**

Date: March 2, 2006

Media Contact: Cindy Gubler (801) 531-0244



## **How The New Water Source Will Be Delivered**

### **Bingham Canyon Water Treatment Plant Overview**

The first phase of the Southwest Jordan Valley Groundwater Project includes the Bingham Canyon Water Treatment Plant, which will extract precious groundwater from deep aquifers in southwestern Salt Lake Valley and treat it through reverse osmosis to provide the public with safe, high quality drinking water.

The plant, which will be constructed and operated by Kennecott Utah Copper Corporation (KUCC), will undergo startup testing January through March 2006. The plant will then start operation in April 2006.

The treated water will be delivered to Jordan Valley Water Conservancy District (JVWCD), which will then conduct additional tests and monitoring to assist in ensuring it meets all federal and state regulations, and then the District will pump, convey, store, and deliver the water to the cities of West Jordan, South Jordan, Riverton and Herriman.

The plant will provide 3,500 acre-feet of water to some of the fastest growing cities in Utah. This is enough water to provide 4,300 homes with water for a year.

### **About The Water Contracts**

The new water will be sold by JVWCD to the cities under water purchase contracts. The wholesale water delivery contracts for water produced by the Bingham County Water Treatment Plant will be for a term of 40 years.

West Jordan City will receive 35 percent of the allocation (1225 acre-feet), South Jordan City will receive 30 percent (1050 acre-feet), Riverton City 20 percent (700 acre-feet) and Herriman City 15 percent (525 acre-feet).

### **How Will The Water Be Priced?**

The water will be sold to the cities at discounted wholesale prices. The wholesale water prices will be discounted by about 15 percent to reflect funding provided by KUCC.

The retail price structure of the four cities should not change as a result of this water pricing.

### **Where The Water Will Be Delivered?**

JVWCD will distribute the treated water through its pipelines, with storage in its three million gallon water storage tank located at 7000 W. 10200 South. The District will deliver this water to wholesale meter stations for the cities of West Jordan, South Jordan, Riverton, and Herriman.



**FOR IMMEDIATE RELEASE**

Date: March 2, 2006

Media Contact: Cindy Gubler (801) 531-0244



**Utah's First Municipal Reverse Osmosis Plant Readies For Operation**  
*Bringing A New Source Of Water To The Southwest Valley*

After years of effort, Utah's first municipal reverse osmosis facility, the Bingham Canyon Water Treatment Plant, which is the first phase of the Southwest Jordan Valley Groundwater Project, is in its final stages of testing for operation.

"We are very pleased that we will soon be able to begin delivering high quality drinking water to some of the fastest growing cities along the Wasatch Front," says Jordan Valley Water Conservancy District's General Manager Dave Ovard. "This is a monumental milestone for the District and for the residents of Utah."

Jordan Valley Water Conservancy District (JVWCD) has been cooperatively working with Kennecott Utah Copper Corporation (KUCC), the Department of Environmental Quality (DEQ) and the Environmental Protection Agency (EPA) to develop and define the Southwest Jordan Valley Groundwater Project, which captures deep underground waters impacted by mining and other activities, purifies the water and delivers it to the communities in the southwestern Salt Lake Valley.

The Bingham Canyon Water Treatment Plant, which is the first of two reverse osmosis treatment facilities that are part of the Southwest Jordan Valley Groundwater Project, was constructed and will be operated by KUCC. The water treated at the plant will then be delivered to JVWCD, which will conduct additional tests to assist in ensuring it meets all federal and state regulations, and then the District will pump, convey, store and deliver the water to the cities of West Jordan, South Jordan, Riverton and Herriman beginning in April 2006.

In a state that only receives 13 inches of precipitation each year on average, the 3,500 acre-feet of water that will be provided by the Bingham County Water Treatment Plant is a much-needed water supply. It is enough water to supply approximately 4,300 homes.

"After years of work, we are proud to begin operations at the Bingham Canyon Water Treatment Plant, which is the first of its kind reverse osmosis plant in the state," says KUCC Louie Cononelos. "The water produced by the plant will be of very high quality."

Reverse osmosis is a pressure driven process, where pressure is used to push water through a membrane, leaving salts behind. It is a proven treatment technology that meets the requirements of all federal and state drinking water standards.

—more—

Although the Bingham Canyon Water Treatment Plant and the Southwest Groundwater Treatment Plant that JVVCD is planning to have operational by the Spring of 2009, are the first of their kind in the state of Utah, nationwide there are more than 300 of these plants that produce more than 1 billion gallons of water per day for drinking water use.

The water obtained through the Bingham Canyon Water Treatment Plant will be rigorously tested by KUCC before it leaves the plant. Once the water is delivered to JVVCD, the District will conduct additional tests to assist in ensuring it meets all federal and state regulations for drinking water and aesthetics. The test results will be reported to DEQ and then the water will be blended with the District's other water sources.

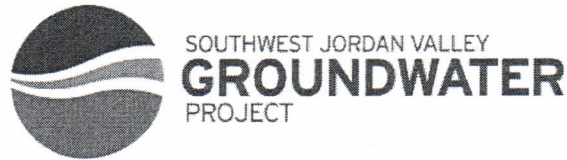
In addition to the two treatment plants that together will deliver 8,235 acre-feet of water per year, the Southwest Jordan Valley Groundwater Project includes 4 shallow production wells, 7 deep production wells; more than 30 miles of pipeline; and 4 booster pumping stations.

"This is an important benefit for the community and the environment," says DEQ Executive Director Dianne Nielson. "I am pleased that the public will begin to receive quality drinking water from this project."

The water from this project will be sold by JVVCD to the four cities at a discounted wholesale price of about 15 percent to reflect the funding for the project provided by KUCC. KUCC made a cash payment and provided a letter of credit worth \$37 million to a natural resource damage trust fund in 1995. Since that time, the trust fund has grown to more than \$62 million. JVVCD will be assuming only those costs related to normal water development and treatment, which is projected to be \$5 to \$10 million in capital costs.

# # #





## **Bingham Canyon Water Treatment Plant**

### **Water Quality and Assurance**

March 2, 2006

Water produced by the Bingham Canyon Water Treatment Plant will be of very high quality. The water quality will meet all state and federal drinking water standards.

Jordan Valley Water is proud of its ability and commitment to deliver safe, high quality water to the communities it serves through analysis, monitoring, process control and providing on-going training and education for its employees, looking for ways to operate its water system more efficiently and upgrading equipment used for water distribution.

The water obtained through the Bingham Canyon Water Treatment Plant will be rigorously tested by Kennecott before it leaves the plant to ensure it meets all federal and state regulations.

Once the water is delivered to Jordan Valley Water, the District will conduct additional tests and monitoring to assist in ensuring it meets all federal and state regulations for drinking water quality and aesthetics. The test results will be reported to the Department of Environmental Quality. The water will then be blended with Jordan Valley Water's other water sources.

The table below shows a recent laboratory analysis of water being treated by the Bingham Canyon Water Treatment Plant. The water quality in the table is also compared with the quality of Provo River water, which has commonly been treated and delivered to the cities of West Jordan, South Jordan, Herriman and Riverton.

The table also shows drinking water standards, and how the water produced by the Bingham Canyon Water Treatment Plant compares with those standards. Note that all the drinking water standards are met, and the water quality is much better than drinking water standards in almost every case.

**Inorganic Water Quality of Deep Groundwater Treated at  
Bingham Canyon Water Treatment Plant, Compared with Other High Quality Water Sources**

Parameter	Units	Maximum Contaminant Level <sup>a</sup>		Groundwater treated at BCWTP <sup>d</sup>	Provo River Water Treated at JVVWTP <sup>e</sup>	SE Salt Lake Valley Groundwater (Untreated) <sup>f</sup>
		Primary <sup>b</sup>	Secondary <sup>c</sup>			
Primary Inorganics						
Antimony	mg/L	0.006		ND	ND	ND
Arsenic	mg/L	0.05		0.0006	0.0014	0.0010
Asbestos	Mil fibers	7			ND	ND
Barium	mg/L	2		ND	0.068	0.082
Beryllium	mg/L	0.004		ND	ND	ND
Cadmium	mg/L	0.005		ND	ND	ND
Chromium	mg/L	0.1		ND	ND	ND
Cyanide	mg/L	0.2		ND	0.0	ND
Fluoride	mg/L	4.0	2	ND	0.3	0.3
Mercury	mg/L	0.002		ND	ND	0.0
Nitrate	mg/L	10		0.3	0.29	1.50
Nitrite	mg/L	1		ND	0.0	0.008
Selenium	mg/L	0.05		0.0011	0.0007	0.0012
Sulfate	mg/L	1000 <sup>g</sup>	250	132	52	36
Thallium	mg/L	0.002		ND	ND	0.00000
TDS	mg/L	2000 <sup>h</sup>	500	250	265	258
Secondary Inorganics						
Aluminum	mg/L		0.05 to 0.2	ND	0.12	0.02
Chloride	mg/L		250	19	17	36
Color	CU		15	0	4.7	4
Copper	mg/L		1	ND	ND	0.0
Iron	mg/L		0.3	ND	ND	0.01
Manganese	mg/L		0.05	ND	0.0	0.00
Odor	CU		3	0	1	0
pH	Units		6.5-8.5	6.92	7.4	7.49
Silver	mg/L		0.1	ND	ND	0.0000
Zinc	mg/L		5	0.01	0.0	0.00
Unregulated Inorganics						
Alkalinity Bicarbonate -	mg/L			27	175	150
Ammonia	mg/L			ND		



**Inorganic Water Quality of Deep Groundwater Treated at  
Bingham Canyon Water Treatment Plant, Compared with Other High Quality Water Sources**

Parameter	Units	Maximum Contaminant Level <sup>a</sup>		Groundwater treated at BCWTP <sup>d</sup>	Provo River Water Treated at JVTWP <sup>e</sup>	SE Salt Lake Valley Groundwater (Untreated) <sup>f</sup>
		Primary <sup>b</sup>	Secondary <sup>c</sup>			
Boron	mg/L				0	0.01
Carbon Dioxide	mg/L				115	116
Calcium	mg/L				44	42
Chlorite	mg/L				ND	
Conductivity	umhos/cm			461	413	403
Hardness	mg/L			177	158	160
Hexavalent Chromium	mg/L			ND		
Langelier Index	None			-1.90		
Methylene Blue Active	mg/L				0	0.04
Molybdenum	mg/L				ND	0.0019
Orthophosphates	mg/L				ND	0.00
Phosphates	mg/L					1.4
Phosphorus	mg/L			ND		
Surfactants	mg/L			ND		
Turbidity	NTU			0.10	0.07	0.34

**Unregulated Metals**

Bromide	mg/L				ND	
Copper	mg/L			ND		
Lead	mg/L			ND	ND	0.0001
Magnesium	mg/L			17.2	14	13.6
Nickel	mg/L			ND	ND	ND
Potassium	mg/L			0.6	2.3	3.1
Sodium	mg/L			10.9	13	22
Silica	mg/L				8.7	16.5
Strontium	mg/L				0.33	0.33

**Notes:**

- (a) From R309-200 Utah Drinking Water Standards (Effective Dec. 9, 2002)
- (b) Enforceable standards, established for protection of human health.
- (c) Recommended but not enforceable standards, established for aesthetic water quality guidelines.
- (d) From a laboratory analysis on December \_\_, 2005.

## Inorganic Water Quality of Deep Groundwater Treated at Bingham Canyon Water Treatment Plant, Compared with Other High Quality Water Sources

Parameter	Units	Maximum Contaminant Level <sup>a</sup>		Groundwater treated at BCWTP <sup>d</sup>	Provo River Water Treated at JVWTP <sup>e</sup>	SE Salt Lake Valley Groundwater (Untreated) <sup>f</sup>
		Primary <sup>b</sup>	Secondary <sup>c</sup>			
(e) Average of 2000-2004 analyses of surface water by Jordan Valley Water.						
(f) Average of 2000-2003 analyses of deep groundwater by Jordan Valley Water.						
(g)						

### Comparison with Other Water Supplies

Water quality for potable water sources is commonly characterized by the following key constituents:

- Total dissolved solids (TDS)
- Total hardness
- Alkalinity

In addition, sulfate is an important parameter, being the elevated ion as a result of mining impacts.

Water sources are commonly considered of very high quality when TDS concentrations are less than 300 milligrams per liter (mg/L), or parts per million (ppm), and with total hardness less than 200 mg/L.

The following table shows these key water quality parameters for the following water supplies:

- Deep groundwater treated at the Bingham Canyon Water Treatment Plant
- Provo River water treated at the Jordan Valley Water Treatment Plant, which has historically been delivered to West Jordan, South Jordan, Herriman and Riverton, and which has been considered the benchmark for high quality water in Salt Lake Valley.
- Southeast South Lake Valley deep groundwater produced by Jordan Valley Water and considered a very high quality water supply.



Comparison of Water Qualities				
Source	TDS (mg/L)	Total Hardness (mg/L)	Alkalinity (as by carbonate; mg/L)	Sulfate (mg/L)
Groundwater treated at BCWTP <sup>a</sup>	250	177	27	132
Provo River water treated at JWWTP <sup>b</sup>	265	158	175	52
South East South Lake Valley deep groundwater <sup>c</sup>	258	160	160	36
<b>Notes:</b> (a) From a laboratory analysis on December ____, 2005 (b) Average of 2004 analyses of Provo River water by Jordan Valley Water at JWWTP and SERWTP. (c) Average of 2000-2004 analyses of deep groundwater by Jordan Valley Water.				

## Monitoring & Assurance

Kennecott will comply with Utah Drinking Water Standards for Public Water Supply in treating and producing water at the Bingham Canyon Water Treatment Plant. All required reporting to the Utah Division of Drinking Water will be performed by Kennecott. In addition Kennecott will continuously monitor the following water quality parameters to assure excellent water quality:

- pH
- conductivity
- temperature

Upon receiving water from the Bingham Canyon Water Treatment Plant, Jordan Valley Water will also monitor the water quality periodically to assure its high quality and compliance with drinking water standards. Jordan Valley Water will also monitor to following water quality parameters continuously:

- pH
- conductivity
- temperature



SOUTHWEST JORDAN VALLEY  
**GROUNDWATER**  
PROJECT



*Plant Production Rate (expressed in different units)*

3,500 acre feet per year

10 acre feet per day

3.5 million gallons per day

2,400 gallons per minute

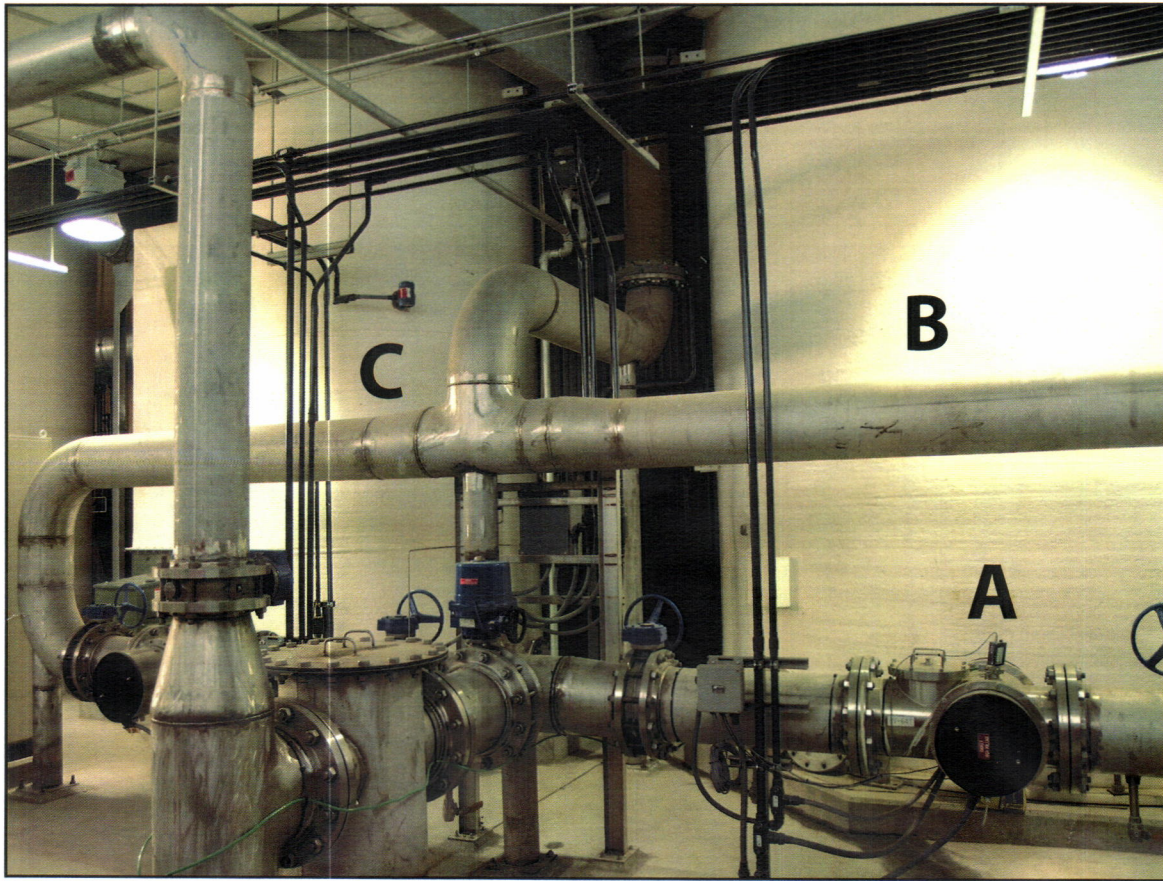
5.4 cubic feet per second





# BINGHAM CANYON WATER TREATMENT PLANT

## WATER TREATMENT PROCESSES



**A**

*Ultra-violet Disinfection.* This process prevents the growth of bacteria or algae in the feed water tank or reverse osmosis membranes.

**B**

*Feed Water Tank.* This tank stores water from the deep wells.

**C**

*Degasifier.* Following the reverse osmosis process the water is trickled down the decarbonator tower. Filtered outside air is blown up the tower to release radon and carbon dioxide.



**D**

*Pre-filtration.* Bag filters and cartridge filters remove silt and sand particles to prevent plugging of reverse osmosis membranes.





**E**

*Antiscalant.* Injection of an antiscalant chemical prevents the formation of salt crystals (scale) on the membranes.



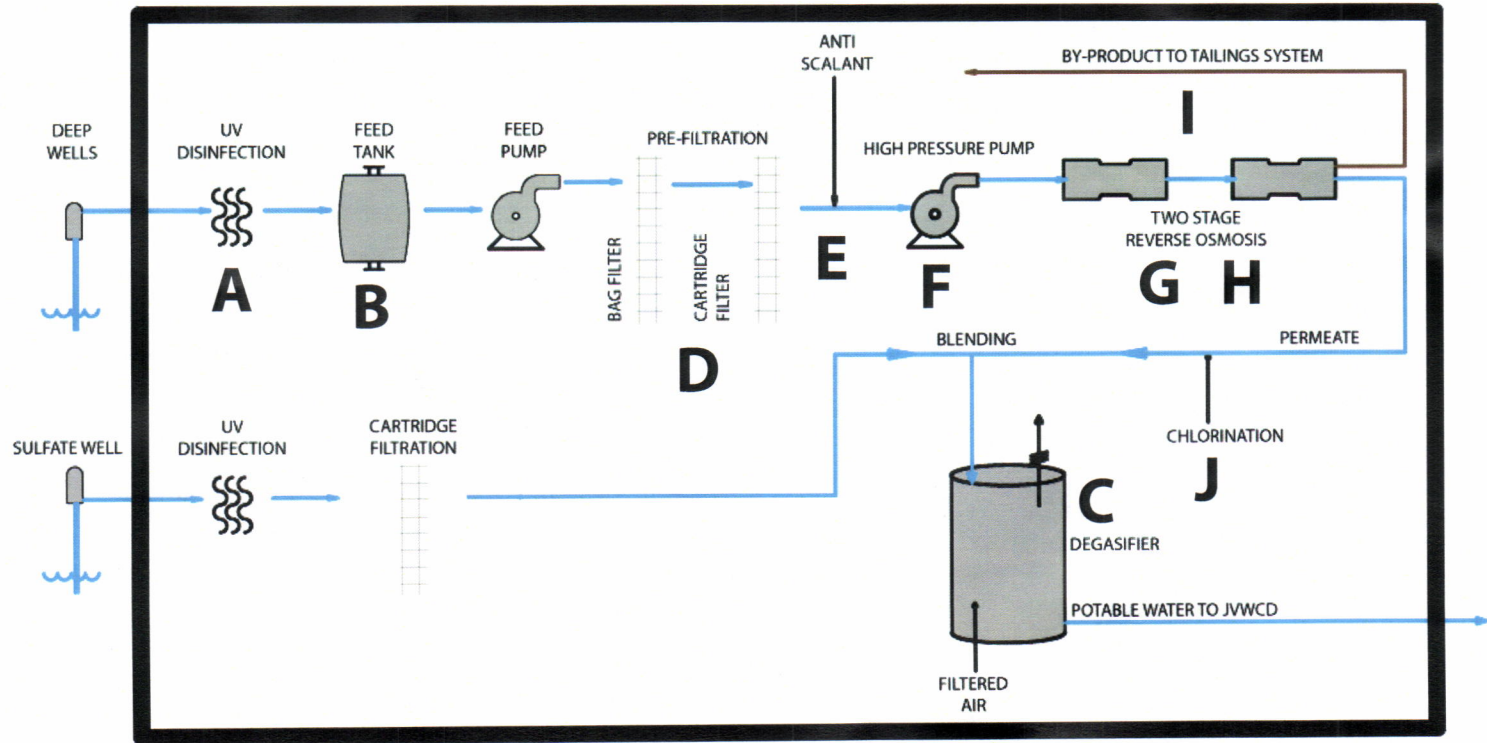
**F**

*Feed Water Pumps.* These pumps create high pressure (175 psi) to force the water through the reverse osmosis membranes.

**G**

*Reverse Osmosis Membrane Unit.* Each of the reverse osmosis units use two stages of membranes to produce 1,500 gpm of permeate. The mineral concentration (total dissolved solids) is reduced from 3,000 mg/L (ppm) to 15 mg/L.

### Treatment Process Diagram







## H

*Real Time Water Quality Monitoring.* Water quality parameters in the reverse osmosis permeate (filtrate) are monitored for real-time quality control of the process.

## I

*By-product.* The by-product from this system consists of 25 to 30 percent of the water and all of the salts. This solution is combined into Kennecott's tailing system and is recycled within the process or discharged to the Great Salt Lake under an existing permit from the State.



## J

*Chlorine Injection.* The chlorine injection system uses electricity to produce a weak liquid chlorine solution from rock salt.

*Blending (Remineralization).* The low mineral concentration in the filtered water is increased by blending with UV disinfected and filtered water. The mineral concentration is raised to match the Provo River supply (total dissolved solids = 250 mg/L)

*Water Quality Laboratory.* To ensure the finished water meets drinking water regulations and the desired quality, Kennecott will perform routine water quality laboratory testing at the treatment plant.



*Jordan Valley Water Quality Monitoring.* Jordan Valley Water will also monitor water quality in real time at the location where Kennecott delivers water from the BCWTP.



